

Off-grid power takes off in Africa

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Africa's leaders are learning to love off-grid renewable energy. What used to be seen as, at best, an adjunct to large-scale thermal and hydro-based national grid supply is now being recognised as a major weapon in the drive to provide electricity access to all Africans.

The adjustment from policies based around centrally managed grids towards more devolved power sources needed a shift in mindset, but laggardly uptake of off-grid supply was also based on practical issues. Early interest in solar power was tempered by high costs, and the poor quality of the equipment available.

Costs have fallen, while efficiency and reliability have improved. The growing urgency of the battle to stem global warming, the potential health benefits and wider availability of private investment have added extra impetus.

Mini-hydro power makes a valuable contribution to both on- and off-grid supply in countries with the right resources, such as Rwanda. But in most of Africa, off-grid renewable energy means solar photovoltaic (PV), whether it be at the household level, or providing power for whole towns and villages, or business parks.

The market for off-grid solar products is now growing fast. In East Africa alone, 2.43m units of off-grid solar products, such as solar lanterns, and solar home systems were sold in the second half of 2019, an increase of 40% on the first half of the year, according to off-grid solar association GOGLA.

The positive social and economic impact is being widely felt among users. A February 2020 report by consultancy 60 Decibels and backed by the UK's CDC, called *Why Off-grid Energy Matters*, found that 88% of off-grid energy customers surveyed felt access to energy products or services had improved their quality of

life. A fifth said they were using their energy product for income-generating activities.

The associated health impact of reduced use of kerosene and other traditional fuels for lighting is another major benefit. Switching to electric light reduces exposure to fine particulate matter by as much as 50-80%, while saving close to half a ton in CO₂-equivalent emissions per household, according to 60 Decibels.

Dynamic market growth

The International Energy Agency forecasts that, with the right policies, Africa could add an average 15 GW a year of all types of solar PV capacity until 2040 – compared with an estimated 6.4 GW in 2019 – as countries seek to make electricity access universal.

Those growth levels are for a best case scenario, but even if they are only partially realised, the off-grid solar power sector is going to continue to attract attention from investors and would-be startups, as well as being revolutionary for users.

Small-scale solar equipment and services provider Azuri calculates that, with around 120m African homes currently without power and a potential for each household to spend \$200 a year on power, the sector represents a commercial opportunity of \$24bn a year plus whatever goods and services can be sold to customers over a “Solar-fintech” platform.

In practice, it will take time to get close to supplying all of these homes, even assuming they go the “solar-fintech” route – and, it will be hard for the very poorest Africans to afford even the cheapest energy services. There is also a risk that companies serving the household solar market could start to move upmarket to more lucrative consumers, as they become established, in search of more reliable revenue streams, leaving new low-income market entrants unserved.

But whatever the challenges, the small-scale solar sector is an area that can be viably served by private investors and has been expanding fast, as we report in the following article.

Mini grids based on solar PV are also becoming more widely deployed in Africa. These require a higher magnitude of spending and more complex infrastructure than small-scale solar and so present a distinct set of challenges, which we look at in the third article of this section.

Pandemic threatens finances

While progress across the off-grid sector has been gathering momentum, future prospects have been clouded by the impact of Covid-19, which has interrupted construction and threatened its financial footing.

Some with low incomes were already making financial sacrifices to bring power into their homes, and now their limited resources may make paying for power a struggle.

“The Covid-19 pandemic is disrupting every off-grid company’s operations and threatening their ability to provide vital power,” says Damilola Ogunbiyi, CEO of SEforALL, a non-profit sustainable energy organisation, and Chair of the 2020 Africa Energy Forum.

An SEforALL survey published in April 2020 showed that, on average, solar home system companies expected to lose 27% of their revenues in the following months due to the pandemic’s effects, while for mini-grid companies, the figure was 40%.

Reversing these impacts may take time, as there is a risk that some of these providers could collapse.

“Ensuring service continuity will require governments to work with donors and investors to support off-grid providers to stay viable and operational. This could include providing emergency financial support to help pay essential staff, ensure safe working environments and, most importantly, allow them to continue servicing their existing customers,” says Ogunbiyi.

Keeping the sector afloat at this difficult time looks essential if ambitions of attaining universal energy access in Africa are to be realised.

Case study: Small hydro, big impact

Mini hydropower projects can provide valuable energy in the more mountainous parts of Africa, and have the advantage over solar power of providing round the clock electricity without the need for battery storage.

Rwanda is one country where the technology works well and is being deployed more extensively to bolster supply. The country has little more than 200 MW of installed generation capacity – around half of it from hydropower projects ranging in size from over 100 MW down to run-of-the-river micro-hydro. Even on a small scale, it’s a valuable contribution in a country where the electrification rate in rural areas is only around 12%.

In one of the latest developments, Norwegian renewables-focused fund manager Empower New Energy signed a power purchase agreement with the state-owned Rwanda Energy Group in December 2019 for a 1.9 MW grid-connected hydropower plant in one of the country's poorest areas. The project will also provide irrigation for farmers.

The run-of-the-river Rucanzogera plant in western Rwanda may be small, but its impact will be high. Set to produce 10.2 GWh of electricity annually, it will improve energy access for some 10,000 people, bringing power to streets, schools and medical facilities. It will mitigate 7,000 tonnes of CO₂, according to Empower.

The fund manager says its investment model uses a portfolio ownership approach to deliver the benefits of Green Bonds and other financing instruments to small and medium-scale projects, with more planned in Africa. Empower will hold equity in the project, along with the project's developers locally based Travaux d'Ingénierie Générale du Rwanda (TIGER) and Norwegian small-power developer Malthe Winje.

The project has a budget of around €7.9m (\$8.9m), of which €0.5m is being provided by Energy and Environment Partnership Trust Fund (EEP).